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THE ONTARIO WATER RESOURCES COMMISSION

9
REPORT ON

RIVER POLLUTION SURVEYS

Don River

MAY 26, 1961

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RIVER POLLUTION SURVEYS

REPORT INDEX

May 26, 1960.

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Don River	Stream Survey	February 7-9, 1961
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D O N R I V E R

AUGUST 16-19, 23,24, 1960

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REPORT

ONTARIO WATER RESOURCES COMMISSION

WATERSHED: Don River

RE: Don River Survey

FIELD INSPECTION BY: A.D. McConnell

REPORT BY: A.D. McConnell, Engineer's Assistant

DATE OF INSPECTION: August 16, 17, 18, 19, 23, 24, 1960.

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INTRODUCTION

A sanitary survey of the Don River Watershed was carried out on August 16, 17, 18, 19, 23 and 24, 1960. The purpose of this survey was to determine the sanitary condition of the stream. Samples were obtained at most sampling stations and from the sewage treatment plants in the watershed.

SAMPLING PROCEDURE

Sampling points are shown on the appended watershed map. These were selected with a view to providing essential information. Grab samples were collected, namely, forty (40) ounce samples for chemical analysis, and six (6) ounce samples for bacteriological analysis. Tests were conducted at the Commission's Laboratory. The analyses of samples obtained from the various sources are appended.

The most useful analyses of sanitary significance are Biochemical Oxygen Demand (B.O.D.), Suspended Solids and Total Coliform Count.

Biochemical Oxygen Demand (B.O.D.)

The B.O.D. of sewage, sewage effluent, polluted waters or industrial wastes is the oxygen required during stabilization (natural purification in a stream) of the decomposable organic matter by

aerobic biochemical action - A high B.O.D. is indicative of pollution.

Suspended Solids

These are reported in parts per million and indicate the measure of undissolved solids of organic or inorganic nature. Where suspended solids values approach 20 parts per million or less, the results are usually reported as turbidity in silica units.

Membrane Filter Coliform Count

The presence of coliforms in water is indicative of contamination by human or animal excrement or by some nonfaecal forms. The membrane filter technique is used to obtain a direct enumeration of coliform organisms.

Interpretation of Analyses

For convenience in the interpretation of laboratory analyses, it may be taken as an objective that pollution in streams should not exceed the following figures:

B.O.D. (Biochemical Oxygen Demand) - 4 ppm (parts per million)

Coliform Counts per 100 ml. Membrane Filter - 2,400

The effluents from sewage treatment plants should have as objectives, figures not in excess of the following:

B.O.D. - 15 ppm

S.S. - 15 ppm

SAMPLING CONDITIONS

Normal summer temperatures prevailed throughout the sampling period. On the two days previous to sampling, .25 and .17 inches of rain fell. No precipitation was recorded for August 16, 17, 18, 19, 20 or 21st. Rainfalls for August 22, 23 and 24 were .03,

.06 and .23 inches respectively. Altogether, throughout the sampling period a total of only .75 inches of rain fell.

SUMMARY OF ANALYSES

East Don River and Tributaries

The sanitary chemical and/or bacteriological analyses of samples collected from the East Don River exceeded OWRC objectives for a clean stream from Brookside Dr., Vaughan Township, downstream to Bayview Ave., Markham Township. Below this sampling point, the river showed gradual improvement south to the Don Mills sewage treatment plant. Downstream from this plant the East Don River again showed some impairment to its junction with Massey Creek and the West Don River.

The samples obtained from the Carrville, Richvale, Langstaff and St. John's creeks, as well as the Little Don River at Yonge St., revealed bacterial impairment. Thornhill Creek and the Little Don River at Steeles Ave. showed no pollution.

West Don River and Tributaries

Except for high B.O.D. and/or coliform contents at the Langstaff Side Road and immediately below the Connaught Medical Research Laboratories sewage treatment plant, the West Don River was in good condition downstream to the Gwendolen sewage plant. Below this point stream quality was satisfactory to its confluence with the East Don River and Massey Creek where a high coliform count was evident.

Sampling showed that Burke Creek was in a satisfactory condition.

Milne Creek had a high bacterial count at York Mills Rd. but

was in good condition at Lawrence Ave.

Massey Creek

Massey Creek showed impairment from Eglinton Ave. to the Pharmacy sewage treatment plant. Below this plant there were marked increases in the B.O.D. and coliform concentrations downstream to the East Don River.

Main Don River and Rosedale Valley Creek

High B.O.D. values were recorded at all sampling stations on the main Don River accompanied by excessive coliform counts.

Rosedale Valley Creek showed heavy bacterial impairment.

Sewage Treatment Plants

There were nine (9) sewage treatment plants operating in the Don River Watershed at the time of sampling. Effluent samples collected from these plants had B.O.D. and suspended solids contents ranging from 4.0 to 154 ppm and 6 to 104 ppm respectively.

CONCLUSIONS

Generally, it may be concluded that the East Don River, its tributaries, Massey Creek and the main Don River were in poor condition.

In 1959, there were fifteen (15) sewage treatment plants operating in the Don River Watershed. To date, there are only nine (9) plants discharging effluent to the various watercourses. Following completion of secondary treatment facilities at the main sewage treatment plant and trunk sewer extensions, the number of plants in this watershed will be reduced to five (5). Also, a reduction in the loading conditions at the remaining plants with-

in Metropolitan Toronto is planned. Consequently, an improvement in the sanitary quality of the waters of the Don River may be expected.

All of which is respectfully submitted,

G. M. Galimbert

Prepared by: A.D. McConnell
Supervised by: J.R. Barr

G. M. Galimbert, Director,
Sanitary Engineering Division.

ADM/sh

Approved by:

A. E. Berry
General Manager

DON RIVER SURVEY

DATE SAMPLED: August 16 to 24, 1960

SAMPLED BY: A.D. McConnell

All analyses in p.p.m. unless otherwise indicated.

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Bacteriological Laboratory	
			Total	Susp.	Diss.		Lab. No.	M.F. Coliform Count/100 ml.
DE26.0	R-2951	1.2	296			7.	R-6748	64,000
DE25.0	R-2952	2.6	360			28.	R-6749	118,000
DERM24.2	R-2953	2.4	824			15.	R-6750	70,000
DE23.8	R-2954	1.7	564			6.	R-6751	49,000
DE23.6	R-2957	7.	498			18.	R-6753	156,000
DE23.2T	R-2955	275.	884	186	698	-	--	---
DE23.2T	R-2956	34.	788	48	740	-	R-6752	300
DE26.0	R-2951	East Don at Brookside Dr., Vaughan Township.						
DE25.0	R-2952	East Don just east of Yonge St. at Elgin Mills Rd. East.						
DERM24.2	R-2953	Rolling Mill Creek just above junction.						
DE23.8	R-2954	East Don at Roseview Ave., Richmond Hill.						
DE23.6	R-2957	East Don at Markham Rd., Richmond Hill.						
DE23.2T	R-2955	Richmond Hill S.T.P. Raw sewage.						
DE23.2T	R-2956	Richmond Hill S.T.P. Effluent.						

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			Turbidity in Silica Units	Bacteriological Laboratory	
			Total	Susp.	Diss.		Lab. No.	M.F. Coliform Count/100 ml.
DE22.6	R-2958	41.	694			13.	R-6754	140,000
DE22.2	R-2959	10.	674			25.	R-6755	295,000
DE21.0	R-2960	36.	676			26.	R-6756	252,000
DE17.2	R-2848	5.6	530			12.	R-6538	840
DELC21.7	R-2962	1.2	288			9.	R-6758	9,000
DELR21.7	R-2963	0.8	264			7.	R-6759	31,000
DEL19.4	R-2964	1.7	324			9.	R-6760	220,000
DELL18.4	R-2965	1.3	446			9.	R-6761	14,000

DE22.6	R-2958	East Don at Observatory Lane .
DE22.2	R-2959	East Don at 16th Ave.
DE21.0	R-2960	East Don at Bayview Ave., Markham Twp.
DE17.2	R-2848	East Don at Leslie St. below Steeles Ave. East.
DELC21.7	R-2962	Carrville Creek just above junction.
DELR21.7	R-2963	Richvale Creek just above junction.
DEL19.4	R-2964	Little Don at Yonge St. above Thornhill.
DELL18.4	R-2965	Langstaff Creek just above junction.

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Lab.	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count/100 ml.
DELT17.3	R-2847	3.6	373					15.	R-6537	.560
DEL17.2	R-2846	1.6	338					12.	R-6536	5,000
DE15.5	R-2843	2.5	376			7.2	20°	21.	R-6533	1,100
DEJ16.4	R-2845	2.2	644	38	606			7.	R-6535	19,000
DEJ16.3T	R-2844	13.	606	46	560			--	R-6534	1,850,000
DE13.6	R-2842	4.1	456			8.0	18°	70.	R-6532	1,500
DEJ15.6	R-2849	1.7	600					12.	R-6539	1,040
DE11.7	R-2798	4.4				11.3	23	52.	R-6468	18,900
DE10.8T	R-2799	240.	586	136	450				--	---
DELT17.3	R-2847	Thornhill Creek at Bayview Ave. above Steeles Ave.								
DEL17.2	R-2846	Little Don at Steeles Ave.								
DE15.5	R-2843	East Don at Finch Ave. East.								
DEJ16.4	R-2845	St. John's Creek above hospital S.T.P. Outfall.								
DEJ16.3T	R-2844	St. John's Hospital, S.T.P. Effluent								
DE13.6	R-2842	East Don at Sheppard Ave. East.								
DEJ15.6	R-2849	St. John's Creek at Finch Ave.								
DE11.7	R-2798	East Don at York Mills Rd.								
DE10.8T	R-2799	Don Mills S.T.P. Raw sewage.								

Sample Point TNo.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Lab.	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count/100 ml.
DE10.8T	R-2800	19.	420	26	394				R-6469	1,900
DE9.8	R-2803	12.				8.2	26	49	R-6461	700
DE8.0	R-2753	9.						65	R-6412	70,000
DE6.0	R-2754	12.				8.3	21	86	R-6413	8,900
DM14.0	R-2755	2.7						8	R-6414	1,900
DM12.4	R-2756	16.						27	R-6415	1,000
DM9.8	R-2757	5.6				8.3	24	23	R-6416	90,000
DM8.7	R-2758	2.4						8	R-6417	14,000
DM8.6T	R-2759	150.	546	146	400				---	---

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Lab.	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count/100 ml.
DM8.6T	R-2747	154.	556	104	452				R-6418	540,000
DM7.2	R-2748	108.						40	R-6408	510,000
DM6.0	R-2751	90.				3.5	20	31	R-6410	1,870,000
DW21.1	R-2961	25.	326					20	R-6757	46,000
DW17.8	R-2881	2.4	364					13	R-6692	900
DW17.4T	R-2966	78.	370					43	--	---
DW17.4T	R-2967	64.	558	46	512				R-6762	0
DW17.2	R-2968	26.	390	46	344				R-6763	10
DW15.8	R-2880	2.8	420					16	R-6691	400
DM8.6T	R-2747	Pharmacy S.T.P. Effluent								
DM7.2	R-2748	Massey Creek above Danforth Park S.T.P.								
DM6.0	R-2751	Massey Creek just above junction.								
DW21.1	R-2961	West Don at Langstaff side rd. west of C.N.R.								
DW17.8	R-2881	West Don above Connaught Laboratories S.T.P. at Steeles Ave.								
DW17.4T	R-2966	Connaught Laboratories S.T.P. raw sewage.								
DW17.4T	R-2967	Connaught Laboratories S.T.P. Effluent.								
DW17.2	R-2968	West Don below Connaught Laboratories S.T.P. outfall.								
DW15.8	R-2880	West Don at Finch Ave.								

Sample Point No.	Lab. No.	5-Day B.O.D.	Solids			D.O.	Sample Temp. C	Turbidity in Silica Units	Bacteriological Lab.	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count/100 ml.
DW13.8	R-2879	1.6	408					15	R-6690	56
DW13.6T	R-2877	245.	734	190	544				---	--
DW13.6T	R-2878	4.0	556	8	548				R-6689	400
DW13.3	R-2876	2.0	372	4	368				R-6688	170,000
DW13.2T	R-2874	205.	712	222	490				---	--
DW13.2T	R-2875	4.8	580	6	574				R-6687	600
DW12.8	R-2873	5.6	464	18	446				R-6686	500
DW12.7T	R-2871	270.	614	180	434				---	--
DW12.7T	R-2872	8.	400	8	392				R-6685	0

DW13.8	R-2879	West Don above Gwendolen S.T.P. Outfall at Sheppard Ave.
DW13.6T	R-2877	Gwendolen S.T.P. raw sewage.
DW13.6T	R-2878	Gwendolen S.T.P. effluent.
DW13.3	R-2876	West Don above Glendale S.T.P. outfall.
DW13.2T	R-2874	Glendale S.T.P. raw sewage.
DW13.2T	R-2875	Glendale S.T.P. effluent.
DW12.8	R-2873	West Don above Armour Heights S.T.P. outfall.
DW12.7T	R-2871	Armour Heights S.T.P. raw sewage.
DW12.7T	R-2872	Armour Heights S.T.P. effluent.

Sample Point No.	Lab. No.	5-Day B.O.D.	<u>Solids</u>			D.O.	Sample Temp. C	Turbidity In Silica Units	<u>Bacteriological Lab.</u>	
			Total	Susp.	Diss.				Lab. No.	M.F. Coliform Count/100 ml.
D1.5	R-2627	12.						17	R-6309	2,270,000
D1.0	R-2728	68.						53	R-6310	90,000
DO.4	R-2729	14.				5	20	27	R-6311	1,340,000

D1.5	R-2627	Don River at Gerrard St.
D1.0	R-2728	Don River at Queen St.
DO.4	R-2729	Don River at Keating St.

D O N R I V E R

FEBRUARY 7 - 9, 1961

The names of certain tributary creeks were revised, entailing some changes in the sampling point numbers. Mileages remain the same. Also certain effluent samples have been eliminated where the S.T.P. has been closed. A revised map was prepared for the 1 9 6 1 and further surveys.

Don River Survey 18

WATERSHED: Don River

RE: Don River Survey

FIELD INSPECTION BY: P. Lonergan and P.J. Walsh

DATE OF INSPECTION: February 7 - 9, 1961

REPORT BY: P.J. Walsh, Engineering Technician

INTRODUCTION:

Fifty-four samples were collected during February 7 - 9, 1961 from the Don River, its tributaries and from the sewage treatment plants located on the watershed.

The analytical results of these samples are presented in Table I of this report.

It was necessary to cut holes through the ice in order to collect some of the samples from the upper reaches of the river.

DON RIVER WATERSHED:

The watershed of the Don River is an area of about 140 square miles, roughly rectangular in shape, lying north of Toronto and including a large portion of the city.

The river has two main branches, known as the East and West Branches. A number of tributaries feed both branches. The latter are mentioned along with a more detailed description of the main branches under the heading of Analyses of Samples.

Ten municipalities are within, or partly within the Don River watershed. The headwaters of the Don are for the most part in Vaughan and Markham Townships; the mid portions of both branches are found in North York, Forest Hill and Toronto. One stream known as Taylor Creek, but referred to in this report as Massey Creek rises in Scarborough Township. A minor southwestern part of the watershed lies in York Township.

EXPLANATION OF LABORATORY TESTS

The analytical determinations used in this survey are presented below. A brief explanation is given as an aid in interpreting the significance of the analyses.

A - Biochemical Oxygen Demand (B.O.D.)

The B.O.D. or Biochemical Oxygen Demand is a measure of the oxygen required to stabilize the decomposing matter in water by aerobic biochemical action.

A high B.O.D. is indicative of pollution. A desirable B.O.D. limit in natural waters is 4 parts per million and a B.O.D. figure of not more than 15 parts per million is usually accepted as being satisfactory for effluents discharging into a stream.

B - Solids

The analysis for solids include total, suspended and dissolved solids.

A suspended solids reading of 15 parts per million or less is generally considered as being satisfactory for effluents entering a watercourse.

Sewage, industrial wastes and land erosion are all significant sources of solids.

The effects of suspended solids in water are reflected in difficulties associated with water purification, deposition in streams, interference with navigation and recreation as well as injury to the habitat of fish.

C - Turbidity

Turbidity is a measure of the fine suspended solids in water such as silt and finely divided organic matter. Where suspended solids values approach 20 parts per million or less, the results are usually reported as turbidity in silica units.

D - Membrane Filter Coliform Count

The membrane filter technique is used to obtain a direct enumeration of coliform organisms. These organisms are normal inhabitants of the intestines of man and other warm-blooded animals. They are present in large numbers in domestic sewage and are, in general, relatively few in number in other stream pollutants. The results are reported as M.F. Coliform count per 100 millilitres.

A count of 2400 per 100 ml in streams is reasonable. Raw or partially treated sewage may contain many million coliform bacteria per 100 ml.

ANALYSES OF SAMPLES

The bacteriological and sanitary chemical analyses of the samples collected in connection with this survey are given in Table I.

The analyses are reviewed by streams as follows:

A - East Don River and Tributaries

The East Branch of the Don River has its source about three miles northwest of Richmond Hill, crosses Yonge Street at Thornhill, and flows in a southeasterly direction to near Oriole Station. There it turns more to the south until it reaches the Forks of the Don, 0.5 miles east of the Thorncliffe Race Track at Don Mills Road.

The East Don has a number of tributaries. They are: Wilson Brook; Wilket Creek; German Mills Creek, its tributaries, Duncan and Cummer Creeks; and Patterson Creek.

The samples collected from the East Branch generally exceeded the OWRC objectives for a clean stream.

The B.O.D. determinations ranged from a minimum of 2.0 ppm at sampling point number DE-26.0 to a high of 32 ppm at DE-22.6.

B - Massey Creek (Taylor Creek)

Massey Creek, which is also known as Taylor Creek, joins the main channel of the Don River at the junction of the East and West Branches. It drains to the southwest corner of Scarborough Township.

Attention is directed to the excessive B.O.D. concentrations of the samples collected from Massey Creek. These may be noted in sampling point number DM-14.0 to DM-6.0. Raw sewage was observed discharging into this stream from a Scarborough Township municipal sewer outlet at Lawrence Avenue East.

C - West Don River and Tributaries

The West Branch rises near the small hamlet of Teston some four miles west of Yonge Street and about 2.5 miles northwest of Maple. It flows roughly parallel to the East Branch, crosses Yonge Street at York Mills in Hogg's Hollow, and continues southeast to the Forks previously mentioned.

Tributaries of the West Don include Walmsley Brook, Milne Creek and Burke Brook.

The quality of the water in the West Don River failed to meet the desired objectives for a clean stream.

The analyses of Milne Creek on this occasion indicated excessive concentrations of B.O.D. as may be noted in sample point numbered DWM-10.6.

D - Don River (proper)

The Don River, below the Forks, runs westward for a short distance, then turns south to the Keating Channel and Toronto Harbour.

Some minor tributaries join the river from the west below the Forks. These are; Mount Pleasant Creek, Rosedale Brook, and Castle Frank Brook. Of the three, only Rosedale Brook contains any appreciable flow.

The analyses show considerable organic and solids pollution in the lower section of the Don River. High bacterial contamination is also noted. The lower stretch of the Don River in appearance had the characteristics of a septic stream which is confirmed by the results of the analyses.

Sample number D-0.0 which was collected at the mouth of the Don River reveals a low B.O.D. of 3.6 ppm and a coliform count of only 600 per 100 millilitres. This is not considered representative of the quality of the water at this point, particularly when compared to the samples collected upstream. These figures may be the result of a sample that contained a mixture of lake and river waters.

E - Sewage Treatment Plant Effluents

The analyses of the final effluents from the sewage treatment plants discharging into the Don River and its tributaries were as follows:

<u>Municipality</u>	<u>S.T.P. and Receiver</u>	<u>5-Day B.O.D.</u>	<u>Susp. Solids</u>	<u>Turbidity in Silica Units</u>	<u>M.F.Coliform Count/100 ml</u>
Richmond Hill	Richmond Hill German Mills Cr.	64.	44	--	153,000
N.York Twp.	St. Joseph's Motherhouse-East Don R.	225.	48	--	20
N.York Twp.	St. John's Hospital Wilket Cr.	170.	118	--	1,890,000
Metro	Don Mills - East Don R.	1.0	16	--	20
N.York Twp.	Connaught Laboratories West Don R.	28.	28	--	400
Metro	Gwendolen West Don R.	8.6	40	--	65,000
Metro	Glendale West Don R.	30.	46	--	15,000
Metro	Armour Heights West Don R.	46.	36	--	71,000
Metro	North Toronto Don River	17.	16	--	940,000
		Final Treated Effluent Only			
Metro	"	230	428		127,000
		Mixture of treated and by-pass effluents			

CONCLUSIONS AND RECOMMENDATIONS

The Don River, particularly the lower section, is still considered as being a heavily polluted stream. This is attributed mainly to the discharge of inadequately treated sewage treatment plant effluents and partly to the discharge of wastes from various sewer outlets.

An improvement in the quality of the water in the Don River is expected when the excess flows from some of the sewage treatment plants located on the Don River Watershed are directed to the Main sewage treatment plant at Ashbridges Bay. The construction of secondary treatment units at the latter plant is expected to be completed in 1961.

The present sewage treatment facilities serving the Connaught Laboratories, St. John's Convalescent Hospital and St. Joseph's Motherhouse are all of a temporary nature. However, it may be some time before these treatment units are completely eliminated and the flows directed to trunk sewers. In the meantime it is requested that every effort be made to improve the quality of the effluents discharging from these plants, particularly the latter two.

It is also recommended that all sources of pollution, such as discharges from sewer outlets, be investigated by the municipalities concerned, and the necessary steps taken to eliminate any pollution found.

All of which is respectfully submitted.

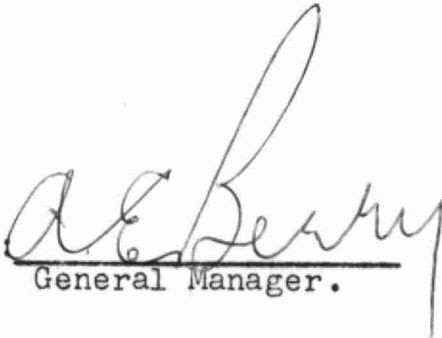
Prepared by: P.J. Walsh

Supervised by: J.R. Barr



G.M. Galimbert, Director,
Sanitary Engineering Division.

Approved



General Manager.

DON RIVER SURVEY

DATE SAMPLED: Feb. 7 - 9, 1961

SAMPLED BY: P.Lonergan & P.J. Walsh

All analyses in p.p.m. unless otherwise indicated.

Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No.	M.F.Coliform Count per 100 ml.
R-166	2.0	346	--	--	6	R-750	40
R-167	64.	760	44	716	--	R-751	153,000
R-168	32.	896	--	--	18	R-752	50
R-169	26.	910	--	--	18	R-753	30

R-166	DEG-26.0	German Mills Creek @ Brookside Dr. (Vaughan Twp.)
R-167	DEG-23.2T	Richmond Hill S.T.P. effluent
R-168	DEG-22.6	German Mills Creek @ Observatory Lane (Markham Twp.)
R-169	DEG-22.2	German Mills Creek @ 16th Ave. (Markham Twp.)

Lab. No. 5-Day B.O.D. Total Solids Susp. Diss. Turbidity in Silica Units Bacteriological Laboratory Lab.No. M.F. Coliform Count per 100 ml.

R-170	30.	910	---	---	17	R-754	11,000
R-171	12.	652	---	---	10	R-755	540
R-172	3.0	452	---	---	10	R-756	510
R-173	2.4	374	---	---	6	R-757	170
R-174	2.5	374	---	---	2	R-758	700
R-176	16.	1200	842	358	--	R-760	149,000
R-177	2.6	382	---	---	5	R-761	120
R-175	225.	506	48	458	--	R-759	20

R-170	DEG-21.0	German Mills Creek @ Bayview Ave. (Markham Twp.)
R-171	DEG-17.2	German Mills Creek @ Leslie St. below Steeles Ave.E.(N.York Twp.)
R-172	DEC-21.7	Carrville Branch @ Bathurst St. (Vaughan Twp.)
R-173	DE-22.1	East Don @ Carrville Road
R-174	DE-19.4	East Don @ East side of Yonge St. above Thornhill (Markham Twp.)
R-176	DET-17.3	Thornhill Branch @ Bayview Ave. above Steeles Ave.E.(Markham Twp.)
R-177	DE-17.2	East Don @ South side of Steeles Ave. East (N.York Twp.)
R-175	DE-17.2T	St. Joseph's Mother House S.T.P. effluent

Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No.	M.F.Coliiform Count per 100 ml.
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R-178	6.4	610	---	---	15	R-762	8,000
R-179	15.	5646	822	4824	--	R-763	137,000
R-180	170.	738	118	620	--	R-764	1,890,000
R-181	7.	642	---	---	13	R-765	17,000
R-182	4.8	606	---	---	8	R-766	20
R-183	1.0	468	16	452	--	R-767	20
R-184	8.0	774	---	---	12	R-768	30
R-185	5.6	624	---	---	13	R-769	20

R-178	DE-15.5	East Don at Finch Ave. East (N.York Twp.)
R-179	DEW-16.4	Wilket Creek at foot bridge above Hospital S.T.P. outfall(N.York Twp.)
R-180	DEW-16.3T	St. John's Convalescent Hospital, S.T.P. effluent (N.York Twp.)
R-181	DE-13.6	East Don at Sheppard Ave. East (N.York Twp.)
R-182	DE-11.7	East Don at York Mills Rd. (N.York Twp.)
R-183	DE-10.8T	Don Mills S.T.P. effluent (N.York Twp.)
R-184	DE-9.8	East Don at Woodbine Ave. below Lawrence Ave. E. (N.York. Twp.)
R-185	DE 8.0	East Don at Eglinton Ave. E. (N. York Twp.)

Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No.	M.F.Coliiform Count per 100 ml.
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R-216	7.8	698	---	---	13	R-856	45,000
R-217	30.	2766	---	---	10	R-857	12,000
R-218	38.	2214	---	---	9	R-858	36,000
R-219	25.	2566	---	---	8	R-859	90
R-220	16.	2028	---	---	8	R-860	7,000
R-221	28.	1756	---	---	9	R-861	154,000
R-222	26.	1726	---	---	11	R-862	122,000

R-216	DE-6.0	East Don just above junction Massey Creek (E.York Twp.)
R-217	DM-14.0	Massey Creek at Lawrence Ave. East (Scarborough Twp.)
R-218	DM-12.4	Massey Creek at Eglinton Ave. East (Scarborough Twp.)
R-219	DM-9.8	Massey Creek at St. Clair Ave. East (Scarborough Twp.)
R-220	DM-8.7	Massey Creek above Pharmacy S.T.P. outfall (Plant inoperative)(Scarborough T.)
R-221	DM-7.2	Massey Creek above Danforth Park S.T.P. (Plant inoperative)(E.York Twp.)
R-222	DM-6.0	Massey Creek just above junction (E.York Twp.)

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Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No. M.F. Coliform Count per 100 ml
R-194	2.0	458	---	---	7	R-803 30
R-195	28.	492	28	464	--	R-804 400
R-196	50.	484	---	---	9	R-805 200
R-197	13.	334	---	---	8	R-806 20
R-198	8.6	616	40	576	--	R-807 65,000
R-199	7.	546	---	---	6	R-808 7,000

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R-194	DW-21.1	West Don at Langstaff side Rd. west of C.N.R.(Vaughan Twp.)
R-195	DW-17.4T	Connaught Laboratories S.T.P. effluent (N.York Twp.)
R-196	DW-17.2	West Don below Connaught Laboratories S.T.P. outfall
R-197	DW-15.8	West Don at Finch Ave. W. (N.York Twp.)
R-198	DW-13.6T	Gwendolen S.T.P. effluent (N.York Twp.)
R-199	DW-13.3	West Don above Glendale S.T.P. outfall (N.York Twp.)

Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No.	M.F.Coliiform Count per 100 ml
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R-186	30.	646	46	600	---	R-809	15,000
R-187	14.	670	64	606	---	R-810	27,000
R-188	46.	536	36	500	---	R-811	71,000
R-189	23.	694	--	---	10	R-812	12,000
R-190	26.	696	--	---	11	R-813	15,000
R-191	8.5	1952	--	---	3	R-814	540
R-192	5.2	980	--	---	28	R-815	890
R-193	23.	1780	--	---	29	R-816	5,000

R-186	DW-13.2T	Glendale S.T.P. effluent (N.York Twp.)
R-187	DW-12.8	West Don above Armour Heights S.T.P. outfall (N.York Twp.)
R-188	DW-12.7T	Armour Heights S.T.P. effluent (N.York Twp.)
R-189	DW-11.7	West Don at York Mills just east of Yonge St. (N.York Twp.)
R-190	DW-9.6	West Don at Lawrence Ave. East (N.York Twp.)
R-191	DWB-10.6	Burke Brook east of Yonge St. (Toronto)
R-192	DWB-9.2	Burke Brook @ west side of Bayview Ave. (N.York Twp.)
R-193	DWM-10.6	Milne Creek @ York Mills Rd. (N.York Twp.)

Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No.	M.F.Coliform Count per 100 ml
R-223	18.	722	---	---	15	R-863	25,000
R-224	14.	822	---	---	12	R-864	32,000
R-225	17.	842	---	---	14	R-865	23,000
R-226	17.	536	16	520	--	R-866	940,000
R-227	230.	1580	428	1152	--	R-867	127,000
R-228	75.	1722	94	1628	--	R-868	30
R-229	69.	3052	1050	2002	--	R-869	80,000

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R-223	DW-6.0	West Don just above junction East Don and Massey Creek					
R-224	D-5.5	Don River above former Todmorden S.T.P. outfall (E.York Twp.)					
R-225	D-4.5	Don River above North Toronto S.T.P. outfall (E.York Twp.)					
R-226	D-4.4T	North Toronto S.T.P. treated effluent					
R-227	D-4.4T	North Toronto S.T.P. final effluent - mixture of treated and by-pass (effluents.)					
R-228	DR-6.6	Rosedale Brook @ north side Hillhurst Blvd. east of Bathurst St.(N.York Twp.)					
R-229	DR-2.5	Rosedale Brook @ Reservation Rd. (Toronto)					

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Lab. No.	5-Day B.O.D.	Total	Solids Susp.	Diss.	Turbidity in Silica Units	Bacteriological Laboratory Lab.No.	M.F.Coliform Count per 100 ml.
R-230	70.	924	144	780	---	R-870	910,000
R-231	73.	882	130	752	---	R-871	980,000
R-232	70.	868	136	732	---	R-872	1,040,000
R-233	66.	850	140	710	---	R-873	1,160,000
R-234	76.	904	160	744	---	R-874	990,000
R-235	3.6	250	---	---	5	R-875	600

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R-230	D-2.3	Don River @ Prince Edward Viaduct (Toronto)
R-231	D-2.0	Don River @ foot bridge Riverdale Park (Toronto)
R-232	D-1.5	Don River @ Gerrard St. E. (Toronto)
R-233	D-1.0	Don River @ Queen St. E. (Toronto)
R-234	D-0.4	Don River @ Inters. Lake Shore Blvd. & E.Don Rdwy. (Toronto)
R-235	D-0.0	Don River @ Cherry St. (Toronto)

W E L L A N D C A N A L

AUGUST 9, 1960

a n d

JANUARY 12, 1961

REPORT

ONTARIO WATER RESOURCES COMMISSION

MUNICIPALITY: Lincoln and Welland Counties

RE: Welland Ship Canal Survey

FIELD INSPECTION BY: A.C. Cooper & Wm. Mannerow

DATE OF INSPECTION: August 9, 1960, January 12, 1961.

REPORT BY: A.C. Cooper, Engineer's Assistant

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INTRODUCTION

Samples were collected at fixed sampling points of the Welland Ship Canal on August 9, 1960 and January 12, 1961.

The weather during the August, 1960, survey was dry and hot and during the latter was sunny with a mid-afternoon temperature of 36°F. The canal had a covering of ice but was open at most of the sampling points.

DESCRIPTION OF WELLAND CANAL

The Welland Ship Canal is an artificial waterway, 25 miles in length, connecting Lake Erie with Lake Ontario. A series of 8 locks overcome the 326' drop between the two lakes.

The canal is a source of water supply for the municipalities of Port Colborne, Welland, Thorold, Thorold Township, Merritton and a number of industries. Water is diverted from the canal at Allanburg to operate the Decew Falls hydro generating station.

KNOWN SOURCES OF POLLUTION TO THE CANAL

Port Colborne - effluents from two sewage treatment plants.

- wastes from two milk processing plants that are included in the town's storm sewer system.

Port Robinson - Standard Steel Company - septic tank to ditch through weed bed to canal.

Crowland Township - Electro Metallurgical Company - industrial waste to canal.

St. Catharines - sewage treatment plant effluent discharges to the canal at Port Weller.

EXPLANATION OF TESTS

The analyses included determinations of biochemical oxygen demand (B.O.D.), solids, turbidity and total coliform count.

A brief explanation of each follows as an aid in interpreting the significance of the tests and the results.

Biochemical Oxygen Demand (B.O.D.) - It is reported in parts per million (p.p.m.) and is a measure of the oxygen required during stabilization (natural purification in a stream) of the decomposable organic matter by aerobic biochemical action. Unless otherwise noted, a 5-day determination with incubation at 20°C. is reported.

A B.O.D. figure of not more than 4 p.p.m. is usually accepted as being satisfactory for water in a stream.

Suspended Solids are reported in parts per million and indicate the amount of undissolved solids of organic or inorganic nature. Total solids and dissolved solids are normally reported simultaneously. Where the amount of suspended solids is visual-

ly noted to be low, the turbidity test is employed for simplicity. Turbidity is measured in parts per million of silica units. It is an optical approximation of suspended matter but not an equivalent of suspended solids.

Coliform Count is employed to indicate recent pollution from human, animal or vegetable origin by the presence of coliforms. The membrane filter technique is employed to obtain a direct count of coliform organisms which are reported per 100 millilitres (ml.)

A count of 2,400 per 100 ml. in streams is reasonable. Raw or partially treated sewage may contain many million coliform bacteria per 100 ml.

ANALYSES OF SAMPLES

The sanitary chemical and bacteriological analyses of samples collected from the canal on both dates are appended.

Two sample points namely, SC 1.1 and SC 25.0, indicated pollution on the August 9, 1960, survey. Samples taken during the latter survey were satisfactory.

When the survey was completed in the summertime the canal was completely flooded. On the latter sampling date the canal was dewatered to a minimal flow between sample points SC 2.0 and SC 7.1.

Sample points SC 25.0 and SC 1.1 were downstream from the Port Colborne and St. Catharines sewage treatment plant outfalls respectively.

CONCLUSIONS

As indicated by the results, the canal was relatively free of pollution at the times of sampling, with the two exceptions described under the analyses of samples.

The Decew Falls generating station and municipal and industrial consumers induce a heavy dilutional flow in the Welland Canal.

All of which is respectfully submitted,

Prepared by: A. C. Cooper	G. M. Galimbert, Director,
Supervised by: G.R. Trewin	Sanitary Engineering Division.

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Approved by: _____
General Manager

Welland Canal Survey

Samples taken Aug. 9/60 by Wm. Mannerow
Samples taken Jan. 12/61 by A.C. Cooper

Sample Point No.	Date Taken	5-Day B.O.D.	Total Solids	Turbidity	M.F. Count/100 ml.	Coliform	Location
SC 1.1	Aug. 9/60	2.1	-	30	90,000		Welland Canal at shore end of Piers, Port Weller
SC 1.1	Jan. 12/61	No sample due to heavy ice covering					
SC 2.0	Aug. 9/60	3.8	-	14	440		Welland Canal, Lake Shore Rd. Bridge
SC 2.0	Jan. 12/61	3.0	204	15	210		" "
SC 5.7	Aug. 9/60	1.6	-	17	1		Welland Canal at Queen Elizabeth Hwy. Bridge
SC 5.7	Jan. 12/61	No sample - heavy ice					
SC 7.1	Aug. 9/60	1.2	-	11	140		Welland Canal at Merriton Queenston Rd. Bridge
SC 7.1	Jan. 12/61	2.0	176	11	33		" " "
SC 8.8	Aug. 9/60	1.1	-	19	70		Welland Canal at Thorold-Peter St. Bridge
SC 8.8	Jan. 12/61	No sample - heavy ice					
SC 9.5	Aug. 9/60	1.2	-	10	240		Welland Canal at Thorold St. Bridge
SC 9.5	Jan. 12/61	3.0	176	9	60		" " "
SC 11.9	Aug. 9/60	1.6	-	11	390		Welland Canal at Allanburg Bridge
SC 11.9	Jan. 12/61	1.6	176	12	190		" " "
SC 14.5	Aug. 9/60	1.2	-	10	340		Welland Canal at Port Robinson Bridge
SC 14.5	Jan. 12/61	2.2	174	10	170		" " "
SC 18.5	Aug. 9/60	1.5	-	7	360		Welland Canal at Main St. Bridge, Welland
SC 18.5	Jan. 12/61	No sample - heavy ice					
SC 19.9	Aug. 9/60	2.3	-	7	150		Welland Canal at Crowland Bridge
SC 19.9	Jan. 12/61	2.7	182	11	90		" " "

Sample Point No.	Date Taken	5-Day B.O.D.	Total Solids	Tur- bidity	M.F. Coliform Count/100 ml.	Location
SC 21.8	Aug. 9/60	1.3	-	4	1,470	Welland Canal at Welland Junction Bridge
SC 21.8	Jan. 12/61	2.0	180	11	111	" " "
SC 25.0	Aug. 9/60	1.6	-	6	114,000	Welland Canal at Main St. Bridge Port Colborne
SC 25.0	Jan. 12/61	3.6	194	8	108	" " "
SC 26.1	Aug. 9/60	1.3	-	3	70	Welland Canal at Clarence St. Bridge Port Colborne
SC 26.1	Jan. 12/61	No sample - heavy ice				

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WELLAND RIVER AND CHIPPAWA

POWER CANAL

FEBRUARY 7 - 9, 1961

REPORT

ONTARIO WATER RESOURCES COMMISSION

WATERSHED: Welland

RE: Welland River and Chippawa Power Canal Survey

FIELD INSPECTION BY: A.C. Cooper & W.R. McCourt

DATE OF INSPECTION: February 7, 8, & 9, 1961

REPORT BY: A.C. Cooper, Engineer's Assistant

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INTRODUCTION:

On February 7, 8, 9, 1961, samples were collected from the Chippawa Power Canal and the Welland River and its tributaries at established sampling points. Such a survey had not been previously performed by the Commission.

Weather Conditions:

As the weather during the month previous to this survey had been very cold with zero temperatures, the streams had a covering of ice measuring from 3 to 16 inches at the majority of the sampling points. This necessitated cutting a hole through the ice to take a sample.

The weather on the days of sampling was sunny and mild with temperatures just below the freezing point.

The flows in parts of the river not carrying dilutional waters from the Welland water works and the Niagara River to the power canal were very low. This condition was caused by a dry fall and the lack of a winter thaw.

WELLAND RIVER WATERSHED:

The Welland River rises about 5 miles southwest of Hamilton and flows easterly for a distance of approximately 70 miles to a point where it enters the Chippawa Power Canal. Flow in the four mile length of channel beyond this point to the Niagara River is reversed for power purposes.

Following the construction of the Chippawa Power Canal, the entire flow of the river was intercepted and carried by this canal to the Sir Adam Beck Generating Station No. 1, from where it discharges to the Lower Niagara River. Previously, the entire flow of the Welland River entered the Niagara River at the Village of Chippawa.

EXPLANATION OF TESTS:

The analyses included determinations of Biochemical Oxygen Demands (B.O.D.), suspended solids, turbidity, and total coliform count.

Biochemical Oxygen Demand (B.O.D.) is reported in parts per million (P.P.M.) and is a measure of the oxygen required during stabilization (natural purification in a stream) of the decomposable organic matter by aerobic biochemical action. Unless otherwise noted, a five-day determination with incubation at 20°C is reported.

High biochemical oxygen demands reduce and may eliminate the dissolved oxygen content in stream waters.

A B.O.D. figure of not more than 4 P.P.M. is usually accepted as being satisfactory for water in a stream.

Suspended Solids are reported in parts per million and indicate the amount of undissolved solids of organic or inorganic nature. Total solids and dissolved solids are normally reported simultaneously. Where the amount of suspended solids is visually noted to be low, the turbidity test is employed for simplicity. Turbidity is measured in parts per million of silica units. It is an optical approximation of suspended matter but not an equivalent of suspended solids.

Coliform Count is employed to indicate recent pollution from human, animal or vegetable origin by the presence of coliforms. The membrane filter technique is employed to obtain a direct count of coliform organisms which are reported per 100 millilitres (ML). A count of 2,400 per 100 ML in streams is reasonable. Raw or partially treated sewage may contain many million coliform bacteria per 100 ML.

SAMPLE ANALYSES:

Appended to this report are results of bacteriological and sanitary chemical analyses performed on samples taken from the Welland River and the Chippawa Power Canal during the February 7, 8, 9, 1961 survey. Analyses of samples taken previously, June 8, 9, 1959 are included for comparison.

Chippawa Power Canal:

Results of samples taken from the Power Canal on this survey were satisfactory.

Analyses from the former survey indicated pollution at sample points P2.8 and P5.4.

There are a number of sewer outfalls to the Power Canal but the high degree of dilution and the velocity of water in the canal are significant factors.

Lyons Creek:

The stream originates in the vicinity of the City of Welland and receives domestic and industrial wastes from this area. The confluence of the creek with Welland River is approximately 11 miles downstream from Welland.

Five of the six samples taken on the latter survey showed varying degrees of pollution. A concentration of iron was noted in the sample taken at Sample Point PWEL 23.2 which is just below the Welland Tubes Ltd.

Thompson's Creek:

The main source of pollution on this stream is the Cyanamid Co. plant. A sample taken one mile downstream from the plant outfall contained high suspended solids and the B.O.D. was above the accepted maximum.

Forks Creek:

A high degree of pollution was indicated in the sample taken at PWFR 32.3. The very low flow in this branch appeared to be effluents from septic tanks of the Winger community and from the Forks Creamery.

Other samples taken from the Forks Creek system that contained above average B.O.D. may be attributed to low flows.

Welland River:

It is noted that pollution was present in the samples taken from the East and West branches of the Welland River just above the entrance of the Chippawa Power Canal as well as Sample Point No. PW 17.4 which is just below the City of Welland.

Low flows and winter conditions probably were the contributing factors to the above average B.O.D.'s in samples taken on the upper reaches of the river, at Sample Point No.'s PW 42.9 and PW 52.2.

CONCLUSIONS:

The sampling survey on February 7, 8, 9, 1961 indicated pollution in both the East and West branches of the Welland River just above the confluence with the Power Canal and at a point just below the City of Welland.

The individual pollution points were not sampled during this survey. Such sampling is carried out when effecting more localized detailed pollution surveys.

All of which is respectfully submitted.

Prepared by: A.C. Cooper

Supervised by: G.R. Trewin

G.M. Galimbert, Director,
Sanitary Engineering Division.

Approved: _____
General Manager.

WELLAND RIVER SYSTEM SURVEY

Samples Taken on June 8, 9, July 7, 8, 1959 by P.J. Walsh and

February 7, 8, 9, 1961 by A.C. Cooper and Wm. McCourt

Date Taken	Sample Point No.	5-Day B.O.D.	Total Solids	Susp. Solids	Turbidity	MF Coliform Count/100ml	Location
June 9/59	P 2.8	6.6	186	20	4.0	1,200	Chippawa Power Canal at Whirlpool Rd.
Feb. 7/61	P 2.8	2.3	184	--	2	114	
June 9/59	P 3.6	3.6	182	12	6.5	900	Chippawa Power Canal at Stamford Centre Rd.
Feb. 7/61	P 3.6	1.5	190	--	1	124	
June 9/59	P 4.3	1.1	168	8	6.0	800	Chippawa Power Canal at Portage Rd. Bridge
Feb. 7/61	P 4.3	2.7	182	--	1	79	
June 9/59	P 5.4	6.8	166	20	3.5	700	Chippawa Power Canal at Dorchester St. (Traffic Circle)
Feb. 7/61	P 5.4	2.4	186	--	1	63	
June 9/59	P 7.2	0.9	172	4	4.3	300	Chippawa Power Canal at McLeod Ave.
Feb. 7/61	P 7.2	1.7	190	--	2	47	
June 9/59	P 8.8	0.8	180	4	3.7	500	Chippawa Power Canal at Junction Welland R. at M.C.R.
Feb. 7/61	P 8.8	2.5	182	--	1	84	
June 9/59	PWE 11.1	0.9	186	6	8.1	130	Welland R. (east) opposite Golf Course west of Stanley Rd.
Feb. 8/61	PWE 11.10	3.8	184	--	3	13,800	
Feb. 8/61	PWE 11.4	2.6	198	--	2	58	Welland R. east of Stanley Rd.
June 9/59	PWEL 12.0	2.1	204	4	22	150	Lyons Creek just above Junction at bridge
Feb. 8/61	PWEL 12.0	2.0	226	--	3	1	
June 9/59	PWEL 13.8	3.8	242	12	24	50	Lyons Creek at Conc. Rd. 5 - Willoughby Twp.
Feb. 8/61	PWEL 13.8	6	408	54	--	20	

Date Taken	Sample Point No.	5-Day B.O.D.	Total Solids	Susp. Solids	Turbidity	MF Coliform Count/100ml	Location
June 9/59	PWELT 14.9	3.7	288	18	21	100	Tee Creek at Conc.Rd. 6 - Willoughby Twp.
Feb. 8/61	PWELT 14.9	14.	1178	122	--	30	
June 9/59	PWEL 14.6	2.0	274	28	25	20	Lyons Creek at Conc.Rd. 6 Willoughby Twp.
Feb. 8/61	PWEL 14.6	16.	428	58	--	50	
June 9/59	PWEL 16.8	1.3	248	16	15	90	Lyons Creek at Twp.Line - Crowland-Willoughby
Feb. 8/61	PWEL 16.8	6	452	42	--	20	
June 9/59	PWEL 19.6	1.6	294	4	15	40	Lyons Creek at side road 1/2 mile below Cooks Mills
Feb. 9/61	PWEL 19.6	7.6	312	--	10	750 (Iron 2.6)	
June 9/59	PWEL 23.2	7.6	342	8	25	190,000	Lyon's Creek at Conc.Rd. 6 Crowland Twp.
Feb. 9/61	PWEL 23.2	21	398	--	37	5,000 (Iron 11.8)	
June 8/59	PWE 12.1	1.2	214	6	3	500	Welland R. East opposite Sodom Rd. - Chippawa
Feb. 8/61	PWE 12.1	1.5	154	--	3	3	
June 9/59	PWE 12.8	1.5	198	44	7	1,000	Welland R. East at bridge below Niagara River
Feb. 7/61	PWE 12.8	2.8	178	--	1	45	
June 9/59	PW 9.2	2.8	190	4	16	300	Welland R. West at Crowland - Willoughby Line
Feb. 7/61	PW 9.2	4.2	220	--	5	5,000	
June 9/59	PWT 9.8	1.6	336	50	26	66	Thompson's Creek at Pt. Robinson Rd. just above junction
Feb. 8/61	PWT 9.8	9	608	406	--	30	
Feb. 8/61	PWT 10.8	12	302	168	--	20	Thompson's Creek just below Cyanamid Plant
June 9/59	PW 11.7	2.8	200	10	12	300	Welland R. opposite side road 2 3/4 miles west of Power C.
Feb. 8/61	PW 11.7	3.7	198	--	2	500	
June 9/59	PW 14.6	1.9	196	16	7	400	Welland R. at Bridge, Port Robinson
Feb. 8/61	PW 14.6	3.2	194	--	2	510	

Date Taken	Sample Point No.	5-Day B.O.D.	Total Solids	Susp. Solids	Turbidity	MF Coliform Count/100ml	Location
June 9/59	PW 17.4	7.1	262	74	34	3,000	Welland R. at Conc.Rd. 3, Crowland Twp. E. of ship canal
Feb. 8/61	PW 17.4	4.9	182	--	2	5,800	
June 9/59	PW 18.6	3	216	26	33	180,000	Welland R. at bridge just W. of ship canal, Welland
Feb. 8/61	PW 18.6	8.0	216	--	2	97,000	
June 9/59	PWX 19.9	2.8	308	56	--	1,000	Coyle Creek at bridge just above mouth
Feb. 9/61	PWX 19.9	10	324	--	14	60	
June 9/59	PW 21.2	14	334	64	87	50,000	Welland R. opposite Pelham-Welland Line
Feb. 8/61	PW 21.2	5.6	264	--	2	7,700	
July 8/59	PWF 25.6	9.2	284	46	--	100	Forks Creek at Highway #3A
Feb. 8/61	PWF 25.6	5.3	396	--	3	39	
June 9/59	PWFW 28.5	3.6	560	70	--	10,000	Wainfleet Br. Forks Cr. at Conc.Rd. 4 & 5-Wainfleet Twp.
Feb. 9/61	PWFW 28.5	14	798	--	10	5	
June 9/59	PWF 28.9	5.0	432	70	--	100	Forks Creek at Hwy.#3A just north of Chambers Cor.
Feb. 9/61	PWF 28.9	30	566	--	34	110	
July 7/59	PWFR 32.3	95	4326	72	--	10,000,000+	Branch from Winger (just below) beside Hwy. #3.
Feb. 9/61	PWFR 32.3	1000	4364	196	--	700	
June 9/59	PW 27.0	3.2	286	38	58	71	Welland R. just opposite jct. of #3A and #57 Hwys.
Feb. 9/61	PW 27.0	4	342	--	5	2,500	
June 9/59	PW 35.2	5	356	26	42	600,000	Welland R. 1/2 mile below Welland Port beside Hwy. #57
Feb. 9/61	PW 35.2	6.5	570	--	4	0	
June 9/61	PWO 42.3	10	372	48	70	100	Oswego Creek at Rd. just above junction
Feb. 9/61	PWO 42.3	6.7	1424	--	8	20	
June 9/59	PW 42.9	5	342	32	65	36	Welland R. at Talbot Rd. just west of Pt.Davidson Station
Feb. 9/61	PW 42.9	9.4	1332	--	6	20	
Feb. 9/61	PW 52.2	8.0	5308	--	9	20	Welland R. at Warner on Smithville - Canborough Rd.



LEGEND

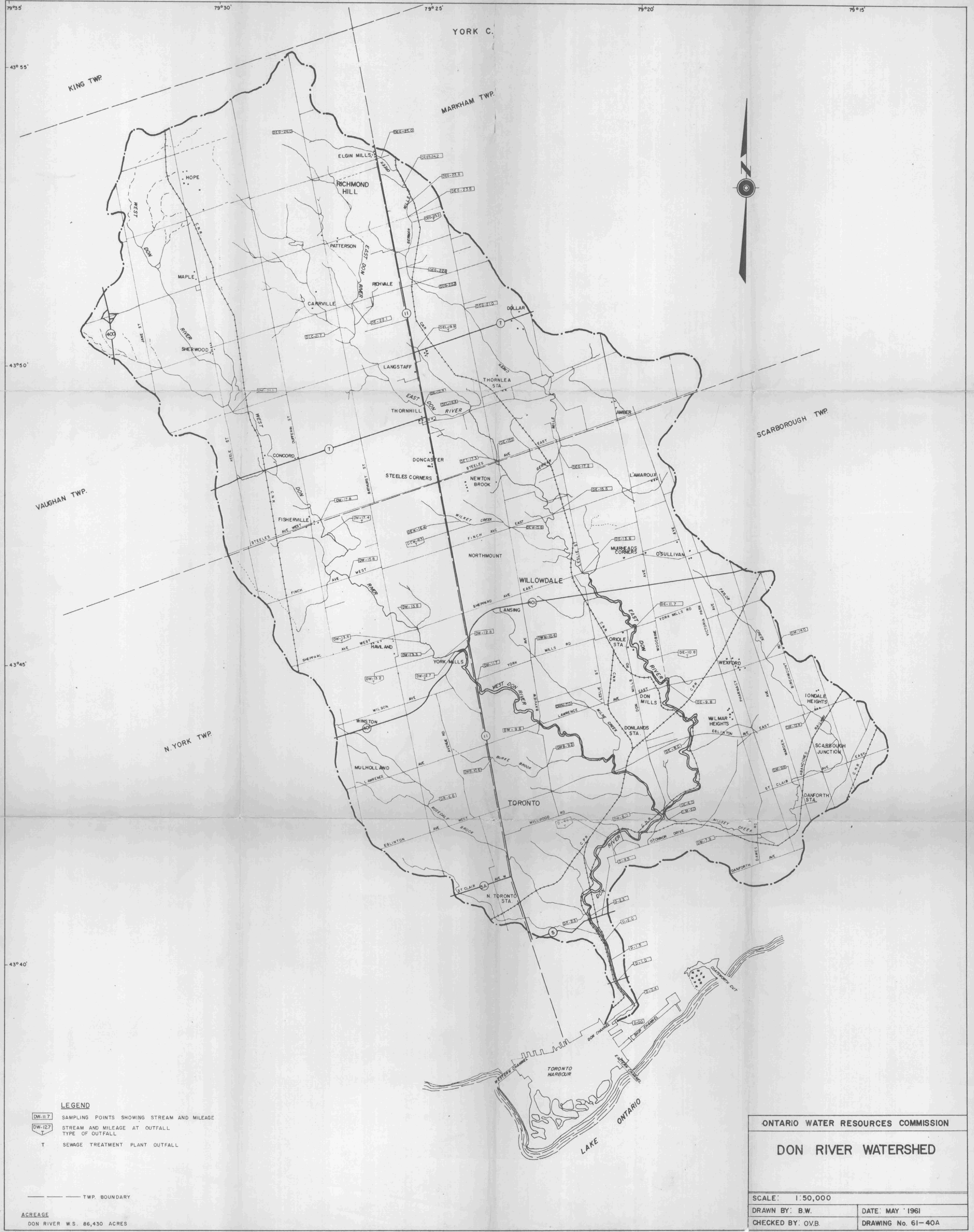
- DW 11.7
SAMPLING POINTS SHOWING STREAM AND MILEAGE
- DA 7.1
STREAM AND MILEAGE AT OUTFALL
TYPE OF OUTFALL
- OUTFALL
- PI PRIVATE SEWER WITH INDUSTRIAL POLLUTION
- T SEWAGE TREATMENT PLANT

TWP. BOUNDARY

ACREAGE
DON RIVER W.S. 86430 ACRES.

DON RIVER WATERSHED

SCALE = 1:50,000



LEGEND

- DW-11.7 SAMPLING POINTS SHOWING STREAM AND MILEAGE
- DW-127 STREAM AND MILEAGE AT OUTFALL
- T SEWAGE TREATMENT PLANT OUTFALL

— TWP. BOUNDARY

ACREAGE
DON RIVER W.S. 86,430 ACRES

ONTARIO WATER RESOURCES COMMISSION

DON RIVER WATERSHED

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